

# **Western Massachusetts Electric Company's Report on Service Quality for Summer 2001 Compliance Filing D.T.E. 01-66**

## **I. Introduction**

On October 29, 2001, Western Massachusetts Electric Company (WMECO or Company) filed a report assessing its distribution system's reliability (October 29 Report). The Department of Telecommunications and Energy (Department) held two public hearings in WMECO's service territory (November 28, 2001 in Pittsfield and November 29, 2001 in Greenfield) to obtain public comment. The Department also held a third public hearing at its offices on January 15, 2002. On March 28, 2002, the Department issued an Order on WMECO's October 29 Report. The Order contained a number of directives. This report responds to the Department's directives.

## **II. Growth Forecasting**

As discussed in the October 29 Report, WMECO's Distribution Asset Management Group (AM Group) forecasts distribution load. These forecasts use the highest historical peak loads in the previous five years for both the full substation and individual circuit loadings as their starting point and look ten years into the future. WMECO has not experienced large load growth in the past decade. From 1990 through 2001, the WMECO summer peak has increased by a total of 3.3%, while winter peaks have been decreasing. Our current projected annual growth rate for the next 10 years is 0.6%. Large customer load increases are known in advance (via reports from WMECO customer account executives) so that we have time to plan for system capacity increases. For 2002 summer, we are using a peak which is 4.5% above the weather normalized 2001 peak (WMECO all time peak) that has been augmented by large customer load increases.

WMECO's parent, Northeast Utilities (NU), has an Economic and Load Forecasting Department (ELF Department) that develops a forecast of total WMECO sales, output requirements and peak demand. The WMECO sales forecast is developed with class-specific econometric models for the short-run and end-use models for long-run forecasting. The forecasted classes are residential, commercial, industrial and street lighting. The econometric models are used for the short-run forecast because they provide accurate results and are relatively inexpensive compared to detailed bottom-up models that rely on extensive market research and data collection.

The end-use models are used for the long-run in order to capture likely structural changes that will materially affect the demand for electricity. To illustrate, end-

use models specifically recognize appliance efficiency standards and building codes that affect both the level of energy demand and seasonal peak loads.

Both the short- and long-run forecasts are driven by economic forecasts for the WMECO service area. Also, both models are based on actual WMECO sales, customers and available end-use data. This methodology has produced accurate forecasts.

Sales are forecasted for the total WMECO service territory. Electric demand is a “derived demand” so electric sales are totally dependent on the local economic conditions, weather, appliance purchases, construction activity, industrial output, etc. Forecast sales are also affected by utility market initiatives. The WMECO forecast process includes two basic steps, development of the Trend Forecast and development of the Reference Plan.

Initially, the ELF Department develops a “trend” or business-as-usual forecast that does not reflect the impact of Company-sponsored marketing initiatives.

The major forecast inputs are as follows:

- ?? Western Massachusetts Economic Outlook—Purchased from forecast services and reviewed for reasonableness by the ELF Department
- ?? WMECO Price of Electricity—Based on rates and forecasted energy prices
- ?? End-Use Assumptions—Based on miscellaneous sources including a WMECO appliance saturation survey

In *step two*, the “trend” is adjusted to reflect Company-sponsored economic development, market retention, demand-side management (DSM), self-generation and major customer changes. This is the “reference plan” that is the official forecast used throughout the Company.

The major forecast inputs to the “reference plan” which are collected from Company information are as follows:

- ?? The “Trend Forecast” as described above
- ?? Economic Development Adders
- ?? DSM Deducts
- ?? Self-Generation Deducts
- ?? Major Customer Changes
- ?? Noteworthy Fuel Switching

The basic energy and peak demand forecasts produced for WMECO build upon forecasted annual sales by class that are subsequently converted into forecasted hourly loads. Forecasted hourly loads are created with load shapes by end use that spread sales by end use to all hours of the year. The forecast of WMECO hourly loads is the summation of all of the end-use hourly load forecasts. The highest summer and winter hourly loads are the forecasted seasonal peak

demands. The forecasted seasonal peaks are calibrated to the most recent actual peaks, normalized for weather. Also, these forecasts implicitly reflect planned Company-sponsored DSM, market and regulatory-driven conservation and load management (C&LM), and average energy losses.

The WMECO peak forecasts by the ELF Department provide overall Company growth rates which are reasonable approximations of growth rates for forecasting substation peaks by the AM Group.

In fact, the WMECO peak growth rates developed by the ELF Department are averages, so it is appropriate to adjust the substation and individual circuit growth rates for local conditions and anticipated changes in large-customer loads. These adjustments are done by the AM Group as these individuals are the most knowledgeable of the status of each of their assigned circuits. When appropriate, the AM Group will increase or decrease the peak load value being used to start the forecast for any known additions or removals due to circuit reconfigurations (load swaps) since the last load forecast was done. The AM Group will add any step loads that are expected on the circuit from specific new business additions or major expansions of existing businesses.

The WMECO load forecasts that are done by the AM Group include the impact of DSM programs as the growth rates used are from the ELF Department forecast which includes the impact of DSM programs. Also, the impact of DSM programs is included in the actual peak values used for the forecast.

The Massachusetts Legislature recently approved extension of conservation program delivery for investor owned utilities. WMECO has had great success with our conservation programs in the commercial, industrial, and residential segments. WMECO's C&LM programs, while designed to target energy savings, do achieve some coincidental demand savings. On average, from 1995 to 2000, WMECO conservation programs saved over 30,000,000 kilowatt-hours per year, which has been included in our annual sales forecast. WMECO continues to offer both commercial/industrial and residential programs including services that reduce energy consumption from HVAC equipment, motors, lighting, and process technologies that will contribute to reducing WMECO's overall peak. The expenditures for the next five years are capped based on the legislative-approved charges to WMECO customers for C&LM.

The WMECO load forecasts reflect the impact of peak shaving. For example, when the 2001 summer peak was experienced, all available incentive-based peak load shaving and load shedding was called upon. WMECO is reluctant to rely on these types of programs as a guaranteed way to reduce peak loads because the program is voluntary and a customer could decide not to shave / shed load in our time of need.

Although load reduction due to peak load shaving is not a guaranteed reduction, it is an opportunity to reduce load that should be pursued. WMECO offers a load response program based on ISO-New England's two initiatives designed to

reduce the region's peak electricity demand, a Demand Response Program and a Price Response Program. The programs provide incentives to encourage large power users to reduce electric demand. The programs went into effect on May 1, 2002, and will help customers manage their facilities' load and support the reliability of the region's power grid during periods of peak demand. WMECO recently completed seminars on this program to which 800 customers were invited. WMECO hopes to add to its current list of participants as a result of these seminars.

The WMECO load forecasts that are done by the AM Group include the impact of transmission and distribution losses as the historical peak values used for the forecast include the losses.

While it is not practical to rebuild the WMECO distribution system to reduce losses as a means of lowering the peak load, all new construction is done with system losses as a consideration. The two main drivers of system losses are conductors and transformers. In 1998, NU did a study to determine what size wire should be used on circuit backbones considering load and voltage limitations as well as economics. The results of the study are used as a guideline when selecting the conductor size of a circuit backbone. All transformers that are purchased by WMECO meet the efficiency requirements of the National Electrical Manufacturers Association (NEMA) Standards Publication TP 1-1996 "Guide for Determining Energy Efficiency for Distribution Transformers."

Another way that WMECO is reducing the losses in its distribution system is with power factor correction. Over the last two years, WMECO installed approximately 30 capacitor banks on its distribution system to improve the power factor of its substations.

We believe that by utilizing the highest peak in the previous 5 years, combined with the ELF forecasted growth rate and large customer load increases, that the WMECO Distribution system will adequately perform during future seasonal peaks. Based upon this methodology, WMECO believes that the Distribution system has enough emergency capacity built into it so to withstand an infrequent extreme weather event.

The load levels generated by the WMECO load forecast are used to review the demands on the WMECO distribution system under normal operating conditions as well as contingency and emergency conditions. WMECO identifies any deficiencies or risks and then takes action to correct the situation.

### **III. Communications and Notification Procedures**

Currently, WMECO.com has a link to a public outage report by town, called the Town Outage Report. However, this report only provides the number of customers served in each town and how many customers are without electric

service. There is no detail of location, nor expected duration of said outage. In the end of 2002, WMECO will be initiating the use of a new computer program to aid with dispatching and outage management, called Electronic Dispatch System (EDS). EDS will be tested in one district, Pittsfield, until we are fully confident of its reliability, accuracy and user proficiency. WMECO projects the initial trial will be completed by the fall of 2003, at which time we will convert all of our dispatching functions over to EDS. After this successful transition, WMECO will procure the additional software necessary to automatically populate an external web application with real time outage data and details. WMECO projects that this enhanced outage information will be operational in the public web domain by the spring of 2004.

As required, WMECO updates the key contact list of public officials on a quarterly basis for the Outage Reporting Protocol (ORP). The district General Managers send the current list to each town served, requesting verification and update to the contact name(s), title(s), and phone number(s). In addition, we also verify contacts annually via WMECO's Emergency Plan review and revision.

#### **IV. Use of Emergency Generators and Other Equipment**

As stated in its October 29 Report, the WMECO distribution system is designed so that restoration of service can be accomplished quickly and easily. Virtually all WMECO outage responses involve switching operations to isolate the faulted portion of the circuit and quickly restore all customers that are not located within the faulted portion of the circuit. This is accomplished with a mix of automatic and manual switching devices. In cases where prolonged interruptions are anticipated, WMECO installs temporary lines and cables to restore service while permanent repairs are completed. Where practical, WMECO builds its distribution system such that alternate supplies are available to provide back up in the event of an outage.

Municipal critical service customers are identified by our Town officials in WMECO's Emergency Plan. WMECO works with municipal officials to prioritize restoration activities to these facilities.

When an outage occurs the most effective use of WMECO's workforce is to isolate the damage, restore as many customers as possible with switching, and repair the damage to allow the remaining block of customers to be restored. This approach allows WMECO to restore service to the largest numbers of customers as quickly as possible. WMECO has considered the addition of portable emergency generators to its restoration process, but has deemed this to be impractical.

The outages on WMECO's distribution system that involve large numbers of customers are on the primary voltage portion of the system. Typically, an outage to the primary results in the loss of supply to a number of transformers. In this situation WMECO can take two approaches to the restoration process. One is to

repair the primary system to restore the supply to the transformers and the other is to deploy numerous emergency generators to supply the loads that these transformers supply.

By repairing the primary system the supply to the transformers can be restored simultaneously. As soon as the primary system is repaired and protective grounds have been removed it can be reenergized to restore the supply to all of the transformers and restore all customers.

Deploying emergency generators would require each of the transformers to be isolated from the WMECO primary system to avoid a backfeed to the fault so the emergency generator could be connected. Depending on the number of transformers involved it could take considerable time for all of the transformers to be isolated from the primary system and for the emergency generators to be installed. WMECO would not be able to begin repairing the fault on the primary system until all of the emergency generators were deployed as all available manpower would initially be devoted to emergency generator deployment. After repairs were made to the primary system it would be necessary to reconnect all of the transformers that had been isolated from it. This process would result in an additional outage to the customer while the emergency generator was disconnected so the transformer could be reconnected to the primary system.

An additional aspect of the use of emergency generators that must be considered is safety. The addition of emergency generators to the repair area adds dangerous sources of potential (the emergency generators can backfeed into the work area of WMECO service restoration workers). While it is possible to protect employees, these additional sources of potential increase the chance of injury.

The only use of emergency generators that WMECO sees as practical and safe is when they are permanently installed. A permanent installation is designed with both safety and reliability as the primary concerns. The installation includes a means of isolating the customer from the WMECO distribution system before allowing the generator to feed the load (typically, called a “break before make” arrangement). This type of connection allows WMECO repair personnel to work on lines without the danger of a backfeed. A permanent installation also has all of the required secondary cables pre-connected so that the generator can be brought on line immediately without any cable work.

As stated in our October 29 Report, most critical customers have their own installed emergency generation that is used to provide backup service in the event of an outage. WMECO recently conducted a survey of its large institutional customers, including hospitals, schools, and municipal buildings to determine if they have emergency generation, to assess whether or not they have adequately sized their back up generation and have proper deployment procedures in place. The survey specifically requested information on the quantity, size, type of load served, and adequacy of deployment. In addition, the survey asked these same customers if they felt they *needed* emergency generation, or planned to add it in

the future, regardless of whether or not it was currently in place. A copy of the survey is attached as Exhibit A.

The survey population was derived from an extract of WMECO's Customer Information System (CIS) comprised of those customers coded as hospital, water/sewer, police/fire, and municipal to capture public schools. State and private colleges and secondary schools were also included in the survey. This resulted in a total of 691 accounts being included in the survey population.

The larger customers and municipalities were surveyed directly by account executives. Smaller customers and municipalities received the survey by mail. The survey was purposefully brief and included a self-addressed, stamped envelope to encourage a return.

Of the 691 accounts covered, 306 responses or 44% were received. Of those responding, 155 or 51% have emergency generation. All but 10 of these customers indicated that their generation was adequately deployed. Each of those 10 indicated that they needed to upgrade their capacity to meet load. Seven are planning to do so.

Of the 141 customers responding that they did not have generation, eight indicated that they are planning to add it.

## **V. Personnel Staffing and Deployment**

### **A. Personnel Availability**

WMECO has implemented a Performance Reward Plan (PRP) to reward employees in many operational areas, including responding to after hours trouble calls. Trouble call response equates to 25% of the entire incentive plan. This year, WMECO has initiated an individualized performance trigger to be eligible for the PRP reward for Callout Response.

In addition to the PRP, WMECO has initiated other changes to improve personnel availability. First, during the most recent collective bargaining negotiations, WMECO agreed to bridge an employee's time if they are called back into work within three hours from the end of their normal workday. Even though this non-worked time is not paid, it enhances an employee's ability to achieve double-time for jobs that extend into the night. Second, WMECO has also agreed to enhance the amount of money provided to employees for meals during evening overtime situations as a means to recognize the efforts of employees who are striving to restore service to our customers. Lastly, to further help restore service during non-business hours, WMECO has agreed to add an additional Troubleshooter Line Mechanic to address service problems during off-hours and expedite customer service restoration.

## **B. Weather Forecasting**

WMECO contracts with a private weather forecast and monitoring center, WSI, Incorporated of Billerica, Massachusetts. Under severe weather conditions, WSI calls and pages specific WMECO management representatives. This is the initiating event to institute WMECO's Storm Planning Conference Calls per our Emergency Restoration Plan. The WMECO Customer Call Center participates on these conference calls and adjusts coverage and staffing to manage the possible influx of customer calls. In concert with the operational staffing, the Customer Call Center will add staffing and/or remain open in Massachusetts instead of transferring to the Northeast Utilities Call Center located in Connecticut. There are limited instances when weather events such as isolated "pop-up" thunderstorms can create local service emergencies that require additional staffing. When these events occur, WMECO quickly musters its management team for conference, including the Customer Call Center team, to enhance staffing as conditions warrant.

## **C. Employee Staffing Levels**

The AM Group at WMECO is responsible for the planning and load forecasting function associated with distribution circuits and substations. A group of personnel, designated as Circuit Owners, are responsible for defining improvements and repairs needed to maintain a high level of system performance in-line with customer needs. The AM Group consists of nine Circuit Owners who are located in four Work Center office locations within the WMECO service territory. Each Circuit Owner is responsible for the operating performance and planned improvements for a specific set of circuits and substations (typically 25 - 30 Circuits and 5 - 6 substations). Their work load includes: a daily review of interruptions, resolution of power quality issues, periodic circuit patrols, project planning, and load growth and system contingency analyses.

WMECO believes that the current level of staffing in the AM Group is sufficient to monitor and analyze performance of the distribution system, and to define system improvements needed to meet forecasted load growth and reliability goals.

Distribution Engineering functions at WMECO are performed by two different groups. WMECO has a System Projects group that designs and writes project level work on the distribution system, and a Field Engineering group.

The project level work consists mainly of work relating to distribution circuit improvements, reliability, road and bridge construction projects, reconductoring, and voltage conversions. Underground projects are also written by this group. The Projects group has four Project Specialists and they work at the Company Headquarters in West Springfield.



Field Engineering functions are performed by Field Technicians. The Field Technicians coordinate and design all customer related work, line extensions, and smaller scale project work and circuit improvements. There are fourteen Field Technicians working at WMECO's four Area Work Centers.

WMECO believes the engineering staffing levels presently in place are adequate to meet its engineering needs.

#### **D. Training Programs for Employees**

Depending on the discipline of the new employee, the core business objective of providing reliable electric service to all customers of WMECO and restoration of it is covered either in new employee orientation or through the Time Merit Progression (TMP) training program for craft workers. The TMP reiterates the safe and timely restoration of service as a priority for all employees. In addition, WMECO reviews our outage restoration processes and priorities with employees during annual Skills Enhancement and Refresher Training and at our annual mock storm drills conducted in each district.

### **VI. Inspection of Above-Ground and Underground Distribution Plant**

WMECO has implemented a process so that field information regarding the condition, size and performance of distribution system components reaches the planning areas of WMECO. WMECO captures key field data on a regular basis into a field-based, hand-held computer system called "Cascade." The Cascade system enables thorough, regular inspection of equipment, and quickly transfers field gathered data to the host computer system. This software tool allows key field data to be immediately and directly available to the Planning and Operating personnel who use this data to drive timely maintenance of equipment insuring continued reliable performance.

As part of its October 29 Report, WMECO performed a cost/benefit analysis of having dedicated inspection personnel. WMECO concluded that based on the robust process described above and the overall training of personnel that it was uneconomical to have dedicated inspection personnel. Upon further examination, nothing has taken place since October 29, 2001 that would change WMECO's conclusion.

### **VII. Summer 2002 Readiness**

The following is a summary of actions taken by WMECO to prepare for summer peak loads and other emergency situations. These actions are part of an annual process and cover the areas of planning, construction, maintenance, and operation, with a particular emphasis on communication. These were reviewed with the Department on May 15, 2002 and the Governor's Office on May 23, 2002.

## **A. Planning**

Within the planning process, WMECO evaluates system needs annually and design the necessary construction projects. The WMECO emergency plan is also updated annually and assures that personnel assignments are up to date. These assignments are tested by running a mock storm in each of the work centers to assure that everyone understands their role. Mock storm exercises are scheduled in June.

## **B. Construction**

In addition to the completion of distribution system construction upgrades, WMECO has also completed a major interconnection project to improve the availability of new generation on the power grid this summer. At West Springfield, Con Ed Energy Massachusetts, Inc. is repowering two 50 MW peaking units. WMECO has completed substation construction to support the project, which should lead to improved availability of the generation. Also, the Berkshire Power generating project supplies 276 MW of generation. In 2002, WMECO completed significant substation construction to interconnect the generator into five 115 kV lines. This will improve the availability of the Berkshire Power generation and will improve the sectionalizing and protection of the 115 kV transmission system.

## **C. Maintenance**

Throughout the year, WMECO completes a formal maintenance program, with additional emphasis on preparation for summer peak loads. A summary of the maintenance work is as follows:

1. Substation inspections have been completed as planned, and are ongoing.
  - ?? There are no significant issues outstanding.
  - ?? As part of the maintenance program, WMECO has verified that all cooling systems are operational on all transformers. This will assure that maximum capability is available for summer.
2. Infrared inspections have been completed as planned to identify system weaknesses
  - ?? Transmission - part of the system was inspected with no issues identified.
  - ?? Substations - major equipment was inspected with no major issues identified. Minor repairs are in progress.
  - ?? Distribution - the scheduled part of the backbone system was inspected with no issues identified.

3. **Transmission helicopter patrols - part of the system was inspected with no issues identified.**
4. **Transmission and Distribution Right Of Way foot patrols are in progress.**

#### **D. Communication**

**WMECO recognizes the importance of communication with customers, municipal officials and with regulatory departments. WMECO has worked diligently with the Department to implement a robust Outage Reporting Protocol. A summary of WMECO communication efforts is as follows:**

1. **Municipal contacts are updated quarterly and filed per the ORP. The most recent filing was April 30, 2002. A process is in place for quarterly review and update.**
2. **Municipal official meetings are scheduled in June. The agenda includes a discussion of the emergency plan and municipal issues.**
3. **The emergency plan annual update is in progress and will be filed with the Department on August 1, 2002.**
- ?? **The Emergency Plan includes an update of municipal official contacts. The officials are contacted by WMECO General Managers during emergencies.**
- ?? **The Emergency Plan includes an update of critical customers. An outage to a critical customer triggers fax notification to municipal officials per the ORP.**
- ?? **The Emergency Plan includes an update of life support customers. These customers are called by automated attendant in anticipation of emergencies.**
4. **Implementation of the ORP is up to date.**
- ?? **Reports to the Department are automated.**
- ?? **A process is in place to send faxes to municipal officials.**
5. **WMECO participates in meetings and exercises to assure ongoing communications with the Massachusetts Emergency Management Agency.**
6. **WMECO maintains informal communication with Department staff during emergency situations to discuss preparations and status updates.**